

## CLAIMS

1. A device for air supply of a fuel cell comprising:

an expander, and

a compressor that is at least partially driven thereby, hot gases of combustion at least occasionally flowing through the expander,

wherein the hot gases, after flowing through the expander, emit at least part of the thermal residual energy remaining in them to at least one of the fuel flows supplied for combustion.

2. The device as described in Claim 1, wherein the exhaust gases after the expander flow through a heat exchanger through which air also flows for combustion.

3. The device as described in Claim 1, wherein the compressor and the expander are configured as one component, and wherein at least one of the compressor and the expander has at least one device by which a medium flowing in, out, or both in and out can be influenced.

4. The device as described in Claim 3, wherein the expander is configured as a turbine having a variable turbine guide screen.

5. The device as described in Claim 3, wherein the compressor is configured with a variable diffuser.
6. The device as described in Claim 1, wherein the combustion takes place in a burner.
7. The device as described in Claim 6, wherein the burner is configured as a catalytic burner.
8. The device as described in Claim 1, wherein the combustion is configured as combustion of a fuel that is supplied directly or indirectly to the fuel cell.
9. The device as described in Claim 1, wherein, at least during occasional phases of operation of the device, the hot gases, after they have emitted at least a part of the residual energy contained in them after the expander to the at least one of the fuel flows supplied for combustion, emit additional residual thermal energy remaining in them to a cooling medium for the fuel cell.
10. The device as described in Claim 9, and further comprising a heat exchanger, which is disposed directly or indirectly in the exhaust gas flow after the

expander, adapted to emit additional remaining residual thermal energy to the cooling medium for the fuel cell.

11. The use of a device as described in Claim 1 in a mobile fuel cell system.

12. The device as described in Claim 3, wherein the at least one device is a variable turbine screen guide.

13. The device as described in Claim 3, wherein the at least one device is a variable diffuser.

14. A mobile fuel cell system having a device for air supply of a fuel cell comprising:

an expander, and

a compressor that is at least partially driven thereby, hot gases of combustion at least occasionally flowing through the expander,

wherein the hot gases, after flowing through the expander, emit at least part of the thermal residual energy remaining in them to at least one of the fuel flows supplied for combustion.

15. The mobile fuel cell system as described in Claim 14, wherein the exhaust gases after the expander flow through a heat exchanger through which air also flows for combustion.

16. The mobile fuel cell system as described in Claim 14, wherein the compressor and the expander are configured as one component, and wherein at least one of the compressor and the expander has at least one device by which a medium flowing in, out, or both in and out can be influenced.

17. The mobile fuel cell system as described in Claim 16, wherein the expander is configured as a turbine having a variable turbine guide screen.

18. The mobile fuel cell system as described in Claim 16, wherein the compressor is configured with a variable diffuser.

19. The mobile fuel cell system as described in Claim 1, wherein the combustion takes place in a burner.

20. The mobile fuel cell system as described in Claim 19, wherein the burner is configured as a catalytic burner.

21. The mobile fuel cell system as described in Claim 14, wherein the combustion is configured as combustion of a fuel that is supplied directly or indirectly to the fuel cell.

22. The mobile fuel cell system as described in Claim 14, wherein, at least during occasional phases of operation of the device, the hot gases, after they have emitted at least a part of the residual energy contained in them after the expander to the at least one of the fuel flows supplied for combustion, emit additional residual thermal energy remaining in them to a cooling medium for the fuel cell.

23. The mobile fuel cell system as described in Claim 22, and further comprising a heat exchanger, which is disposed directly or indirectly in the exhaust gas flow after the expander, adapted to emit additional remaining residual thermal energy to the cooling medium for the fuel cell.

24. The mobile fuel cell system as described in Claim 16, wherein the at least one device is a variable turbine screen guide.

25. The mobile fuel cell system as described in Claim 16, wherein the at least one device is a variable diffuser.